

Institute *of* **Physics**

**Electron Microscopy and
Analysis Group**

Newsletter

July 2003

ELECTRON MICROSCOPY AND ANALYSIS GROUP

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ELECTRON MICROSCOPY AND ANALYSIS GROUP

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ELECTRON MICROSCOPY AND ANALYSIS GROUP

Dear EMAG Member,

Since the December 2002 Newsletter the routine business of the committee has continued with preparations for the EMAG conference, 3-5 September 2003, hosted by Oxford University. The programme and registration details have now been circulated. It looks like it should be a fun event!

The main purpose of this Newsletter is to present the minutes of the 2002 AGM, in addition to the conference reports from research workers supported by EMAG / RMS bursaries. An update on the SuperSTEM is also presented.

Please also note the agenda for the 2003 AGM that will be held during the EMAG conference on Wednesday 3 Sept at 5:10pm in the Examination Schools of the University of Oxford. Future collaborations between EMAG and the RMS will be discussed at this meeting.

Further information on EMAG activities are available at the IoP website at the address:

<http://www.iop.org/IOP/Groups/EM/>.

See you in Oxford in September!

BURSARIES

Members are reminded that EMAG bursaries are available for research students and younger postdocs who wish to attend relevant conferences either in the UK or abroad. Preference will be given to those who are presenting papers and have shown that they have tried to obtain part of their funding from other suitable sources. In general, only one bursary per year can be awarded to each person. A completed application form (see the back of this Newsletter) as well as a short reference from a research supervisor confirming eligibility and suitability should be sent to the Chairman of the Bursary Sub-Committee, Dr David McComb¹. Each successful applicant must submit a short report on the meeting they attended to the Chairman of the Bursary Sub-Committee.

*Dr Paul D Brown, Nottingham
EMAG Secretary / Treasurer*

¹ Please note a change of address to the Department of Materials, Imperial College London, Exhibition Road, London SW7 2AZ. (Email: d.mccomb@imperial.ac.uk).

ELECTRON MICROSCOPY AND ANALYSIS GROUP

COMMITTEE ELECTIONS

The committee remains stable at the moment, with Rik Brydson continuing as Chairman for the forthcoming session; while PDB will continue in the role of secretary / treasurer. Even though Steve McVitie has completed his term of office, he will continue his involvement as Proceedings Editor for the EMAG conference.

Due to the retirement of Rod Shipley and Simon Galloway (we warmly thank them for their efforts over the past three years) plus the resignation of Ciara Mullen and the existing committee vacancy from 2002, there are presently four vacancies for ordinary committee members to join the EMAG committee in September. In order to maintain the academic / industrial balance of the committee and an appropriate UK geographical representation, the current committee has nominated the following for election:

Dr Richard Baker	University of Dundee
Pete Lander	Jeol UK
Kevin Meade	Oxford Instruments
Dr. Pauline Sillers	Syngenta

On page 19 of this *Newsletter* is a form on which other nominations can be made. If further nominations are received, there will be a postal ballot of all members in late August. If not, those persons nominated by the committee will be declared elected at the AGM.

The deadline for nominations to the Committee is **15 August 2002**.

The AGM will be held at the EMAG conference on Wednesday 3 Sept at 5:10pm, room 6, Examination Schools of the University of Oxford, immediately following on from the scientific session. The AGM will be followed by the Exhibition Reception.

An agenda and minutes of the last AGM are included on following pages.

ELECTRON MICROSCOPY AND ANALYSIS GROUP

2003 ANNUAL GENERAL MEETING AGENDA

The Annual General Meeting of the Group will be held during the EMAG conference, in room 6 of the Examination Schools of the University of Oxford, on Wednesday 3 Sept at 5:10pm.

The proposed Agenda is as follows:

1. Minutes of the 2002 AGM (18 September 2002)
2. Matters arising from the Minutes
3. Honorary Secretary's report for the year 2002 / 2003
4. Financial Report
5. Results of the election of members to the EMAG Committee
6. Future collaborations between EMAG and RMS
7. European Microscopy Society news
8. Report on SuperSTEM
9. Any Other Business

**Minutes of the AGM held on 18 September 2002 at
The Institute of Physics Headquarters at 12.30 pm**

1. Minutes of the 2001 AGM (5 September 2001)

The minutes were signed by the Chairman as a true record of the meeting.

2. Matters arising from the minutes

There were no matters arising from the minutes.

◆ Honorary Secretary's Report from 2001/2002

Since the last AGM, the Group has organised, or contributed to, the following meetings:

***Electronic Structure and Spectroscopy – EMAG sponsored session at IoP Congress 2002
(8 April 2002 - Brighton)***

Prof. Alan Craven (Glasgow) organised the symposium – an audience of about 50 heard 2 invited talks (Drs de Groot and McComb), three contributed talks and 12 poster contributions. EMAG contributed a poster prize and travel expenses for the invited speakers. Other talks within the congress discussed new developments in microscopy including aberration corrected HRTEM, Atom Probe and Scanning near field techniques.

FEGTEM IV (1 July 2002 – Oxford)

The latest meeting in this popular series was organised by Crispin Hetherington and John Hutchison of RMS and co-sponsored by EMAG and attracted around 50 attendees. Invited talks were given by Profs Fuller and Zandbergen and were accompanied by a number of contributed talks from the various UK FEGTEM groups. This meeting will be repeated at another venue next year.

RMS Microscience 2002 (9-11 July 2002 - Excel Centre, London Docklands)

EMAG co-sponsored 2 sessions on the last day of this new format RMS congress – Energy filtered TEM (invited speakers Prof. Christian Colliex and Dr Paul Midgley) and the second SuperSTEM workshop (invited speakers Dr Pete Nellist and Dr Andrew Bleloch). Attendance was much improved on previous Physical Science sessions at Micro attracting 55 (EFTEM) and 40 (SuperSTEM) attendees. Overall around 450 people attended scientific sessions over the 3 days.

Warm thanks are due to all who have helped with the organisation of these meetings.

Future EMAG plans include:

(i) Microscopy of Semiconducting Materials MSM XIII, 31 March – 3 April 2003, Churchill College, Cambridge.

(ii) A further symposium on “Nanoscale Physics and Technology” as a part of CMMP 2003 which is scheduled for 6-9 April 2003 in Belfast.

(iii) EMAG 2003 which will be held at The University of Oxford on 3-5 September 2003 and will be preceded by a one day Advanced School dealing a range of imaging techniques in electron and related microscopies on the 2nd September.

(iv) Meeting with RMS on Microscopy of Nanostructures and Nanoparticles with Dr Serena Best.

◆ Honorary Treasurer's Report

At the end of September 2001 the balance in the EMAG group account was **£9,333.80** in credit. A sum of £840, the income from the EMAG 2001 conference, was paid into the account in June 2002. This figure is much reduced from previous years owing to a lower overall conference attendance. Additionally the IoP provided £3,828 to cover the costs of postage, printing, stationary, telephones and committee expenses.

A sum of **£500** was used to sponsor invited speakers and provide poster prizes at the

conference sessions outlined in section 3. Additional expenses for meetings during summer 2002 have yet to be processed.

During the period September 2001 to July 2002, bursaries to a total value of £2,100 were provided for 11 young people from a range of institutions to attend major overseas and UK meetings. In addition 7 applications for bursaries totalling £2,100 to attend ICEM were made together with the RMS from former BJCEM funds.

A further £4,420 was committed to 34 young scientists in the form of bursaries to attend the EMAG 2001 conference.

The balance of the Group Account after these and general outgoings is **£4,619.08**. (end July 2002). Unfortunately future bursary support for overseas conferences will have to be closely monitored until we know the likely financial outcome from EMAG 2003.

Possible outgoings that are anticipated over the next two academic years include bursaries for MSM 2003 and EMAG 2003, so the Group Account funds have and will continue to be employed usefully.

◆ **Results of the Election of Members to the EMAG Committee**

<i>Retired from the Committee:</i>	Dr S McVitie as Chairperson Dr RMD Brydson as Secretary/Honorary Treasurer
<i>Stepping down:</i>	Dr A Burrows Dr M Strangwood
<i>Appointed to the Committee:</i>	Dr RMD Brydson as Chairperson Dr PD Brown as Secretary/Honorary Treasurer
<i>Nominated by the Committee as Ordinary Members:</i>	Dr DW McComb and Dr T Rong.

There being as many nominations as places available, all were declared elected.

◆ **SuperSTEM facility**

The Secretary informed the AGM that the first STEM objective lens aberration corrector has recently been installed on an existing STEM - SuperSTEM I in Cambridge and the first exciting results from this instrument had been presented at the second SuperSTEM workshop which formed a part of RMS Microscience 2002 on July 2002 in London's ExCel centre and also at the ICEM conference in Durban. Once thoroughly tested this machine will be moved to a purpose built building at Daresbury Laboratories in September/October 2002 and plans are already unfolding for the design of the second generation machine – SuperSTEM II. To find out the latest news, please attend the workshop if you can – otherwise see the SuperSTEM website <http://www.superstem.org.uk>

◆ **European Microscopy Society**

The Chairman outlined the history and structure of European Microscopy Society. He reported that the IOP had agreed to pay the en-bloc membership fee for all EMAG members and noted that IOP already had a similar agreement for some other European societies. Thus all members of EMAG are automatically members of the European Microscopy Society, at no cost to themselves. However, in order to receive information from the EMS, it is essential for EMAG members to send their e-mail address to the EMS secretary – as this cannot be sent by the IoP due to the Data Protection Act. This is vitally important, since almost all communications from the EMS are sent by e-mail, including information for voting for the next Executive Board. This announcement was sent with the January newsletter, however only around 20% of EMAG members replied. Thus if EMAG members had not already responded, the Chairman asked that they please send their e-mail address (and preferably other details, postal address, phone & fax numbers) to wisse@cyto.vub.ac.be and to hawkes@cemes.fr and indicate whether they agree to have this information included in the EMS Yearbook. If they do NOT wish to appear in the Yearbook, their e-mail address will be used solely for the despatch of information by the EMS secretary (Prof Dr E. Wisse, Free University of Brussels).

With regard to EMS constitutional issues it was noted that only one national society could be

present at the EMS council with an entitlement of two votes as long as the society had more than 300 members. In the case of the UK the RMS and EMAG are the two national societies and the one with the largest number of members would be eligible to vote. It was not clear how many of the RMS members have elected to join EMS through their partial en-bloc membership route. However acceptance of the IOP en-bloc payment may make EMAG the UK society with the largest EMS membership and so be entitled to the votes at EMS Council.

◆ **ICEM**

The secretary informed the AGM that the International Congress for Electron Microscopy (ICEM XV) had been held in Durban, South Africa from 1-6 September 2002 and had been a very good scientific meeting. The International Federation of Societies for Electron Microscopy (IFSEM) had met (EMAG being represented by the Hon. Sec) and had agreed to drop the “E for electron” and become IFSM to broaden appeal. Prof David Cockayne had been elected the new President of IFSM and Sapporo, Japan was chosen as the next venue for the International Congress for Microscopy (ICM XVI) in 2006 after beating of strong competition from China.

◆ **AOB**

None to report

The meeting closed at 1.00pm

Dr. Rik Brydson
EMAG Hon. Secretary / Treasurer

September 2002

ELECTRON MICROSCOPY AND ANALYSIS GROUP

SuperSTEM

SuperSTEM update

Since the last EMAG newsletter, the first aberration-corrected machine SuperSTEM 1 has been progressively improved in the purpose built facility at Daresbury laboratories. Current imaging resolution in high angle annular dark field images is around 1.1 Angstroms and single column EELS spectroscopy has been demonstrated in a silicon sample. The first full journal results which have solved the atomic structure of a nickel disilicide / silicon interface have recently been submitted to Physical Review Letters. Furthermore a recent EPSRC grant application for six PhD studentships associated with the SuperSTEM facility has recently been funded which should provide an excellent platform for future training of users.

A number of external users have already had access to the machine. The SuperSTEM management committee has now set up a procedure for interested users to apply for time on the UK user facility. The basic procedure is that users apply via the website: <http://www.superstem.dl.ac.uk> for time on the instrument. You have to apply by the first of the month for microscope time during the following month. The applications are considered by a committee consisting of Dr Andrew Bleloch, Technical Director, Dr David McComb and Dr Rik Brydson from the EMAG Committee and Dr Crispin Hetherington from the RMS. You will be notified within 2 weeks of the outcome. If you would like any further information on the booking/allocation procedure, then please do not hesitate to contact Helen Blanchard SuperSTEM Secretary, email hblanch@liverpool.ac.uk.

We encourage EMAG members to submit project proposals and to see the facility in action.

Dr Rik Brydson, SuperSTEM Management Committee

For further details about the facility see the SuperSTEM website: <http://www.superstem.dl.ac.uk/>
or contact Dr Andrew Bleloch ab122@cam.ac.uk
or Prof Peter Goodhew goodhew@liverpool.ac.uk

Rik Brydson / Andrew Bleloch

ELECTRON MICROSCOPY AND ANALYSIS GROUP

MEETING REPORTS

18th General Meeting for the International Mineralogical Association, 1-6 September 2002

The General Meeting for the International Mineralogical Association held in on the 1-6th of September 2002 in Edinburgh was very well attended by over 1000 delegates. Although the program was directed at mineralogy there were contributions from a number of well-known microscopists / spectroscopists, including Peter Buseck and Lawrence Garvie. The conference included nine plenary lectures, which covered some of the current research areas in mineralogy and material science, presented by leading researchers such as David Vaughan, Andrew Putnis and Ekhard Saljie. The session on the electronic structure of minerals was very interesting, but due to a very bad cold that resulted in the loss of my voice, I was unable to present my contribution. The social aspects of the conference were excellent. The “ice breaker” was held in the Dynamic Earth exhibition and included a guided tour, but unfortunately did not include the Walking with Dinosaurs exhibit, which was a real shame! There was also a whisky tasting and ceilidh (which I missed due to my cold) and for those with a large amount of cash to spare, a banquet was held in the library of Old College, which I was told was a very good evening.

*Clair C. Calvert, Leeds
sponsored by EMAG bursary*

Materials Research Society Fall meeting, Boston, Dec 2002

The Materials Research Society Fall meeting was held in the Hynes convention centre, Boston, USA from the 2nd-6th December 2002. The conference was divided into 38 separate symposia, each falling under seven subject headings – Polymers & Biomaterials, Nanomaterials and Technology, Electronic and Photonic Materials, Spin, Superconductivity and Ferroelectricity, Surfaces, Interfaces and Membranes, Metals, Alloys and Inorganics and Materials Science and Society.

My interest lay with Electronic & Photonic Materials, and in particular symposium O – Microphotonics III – Materials and Applications. This commenced the day prior to the conference starting in proper with a fantastic 2 hour tutorial presented John D. Joannopoulos & David Norris, providing an exciting review of current progress in both theoretical and experimental photonic crystal research. This concluded with an in depth question and answer session and informal discussion.

The overall format of the meeting was morning and afternoon sessions, followed by posters in the evening. The first session of the week for me was the most interesting, chaired by Y. Vlasov and entitled Soft Condensed Matter approaches to 3D photonic crystals. The focus was clearly on 3D photonic crystals, and covered many interesting aspects of their formation. The theme of this symposium gradually changed through the course of the week covering 2D photonic fibres, photonic devices and concluding with microphotonics.

During the week there were around 70 speakers at this symposia, from countries as far afield as Australia and China, as well as a considerable number of European authors and a great number from North America. With such a range of speakers the standard of presentation was exceptionally high, however to highlight a few, those by P. V. Braun (UIUC), J.P. Hoogenboom (Debye Institute), W. J. Wadsworth (Bath), Y. Fink (MIT) and T. Krauss (St. Andrews) were outstanding. I presented a poster at the Tuesday evening poster session, which was a truly great experience. The location was a massive conference hall with literally hundreds of other student, academic and industrial researchers, providing a unique opportunity to meet and speak with a diverse range of photonic crystal researchers as well as those working in related fields.

Alongside the conference ran a massive trade exhibition for 2 days, with a huge number of exhibitors displaying state of the art research equipment and chemicals covering almost every area of materials research. In conclusion the conference provided an excellent opportunity to gain an insight into current

world-wide research in materials science, and to be hosted in such a picturesque and historical city as Boston improved what was already a wonderful experience. With this in mind I wish to thank the IoP Electron Microscopy and Analysis Group for their contribution towards conference expenses.

*Martyn McLachlan, University of Glasgow
sponsored by EMAG bursary*

**13th International Conference on Microscopy of Semiconducting Materials
Churchill College, Cambridge, 31st March to the 3rd April.**

The conference was focused on the latest developments in the study of structural and electronic properties of semiconducting materials by the application of transmission and scanning electron microscopy, scanning probe microscopy and X-ray topography and diffraction.

The oral presentations were divided into the following sessions: high resolution microscopy and microanalysis, quantum domain structures, epitaxy, processing, scanning electron and ion advances and scanning probe microscopy, staging a total of 85 speeches. Even more posters (137) were presented on these topics, bringing together scientist from all over the world. The newest products in microscopy and sample preparation were displayed at the commercial exhibition that accompanied the conference.

My contribution was on the characterisation of Au/n-type GaN contacts using the electron beam induced current (EBIC) method, and I was extremely pleased to have the opportunity to speak with some of the leading scientist in this area. I managed to have a lengthy and extremely useful discussion with Dr. Simon Galloway from Gatan on EBIC as I also did, on several occasions, with Prof. Eugene B. Yakimov from the Russian Academy of Science. I also greatly appreciate the discussions with Dr. Paul Edwards from the University of Strathclyde and the MATELECT exhibitors on their EBIC amplifier and software. I also had the pleasure to meet and to exchange information with other students from Cambridge and Oxford that work on GaN.

The MSM XIII conference was an extremely valuable scientific experience that enhanced my understanding of microscopy and microanalysis and provided me with the opportunity to meet some of the leading scientists on EBIC. I would like to thank the EMAG for their financial support for this conference.

*Grigore Moldovan, University of Nottingham
sponsored by EMAG bursary*

**13th International Conference on Microscopy of Semiconducting Materials
Churchill College, Cambridge, 31st March to the 3rd April.**

The MSM conference held at Churchill College, Cambridge, attracted leading microscopists from the UK and overseas to discuss the latest developments in the study of the structural and electronic properties of semiconducting materials by transmission and scanning electron microscopy. What distinguishes the MSM conference from other conferences in the field is that it brings together scanning probe microscopists and electron microscopists to discuss advances in their respective experimental techniques as well as in their common fields of research. To this end, the sessions were organised such that all the participants had the opportunity to attend all the talks. The topics of the sessions reflected the diversity of participants' research areas and many sessions focussed on the application of various microscopy techniques to a common group of semiconductor materials or devices.

The advances in aberration-corrected STEM, as well as the challenges faced by researchers trying to build nano-machines by the manipulation of single atoms on a semiconductor surface using STM were demonstrated. A trend throughout the conference was the focus on semiconductor nanostructures. Significant advances were presented in the use of cross-sectional STM to study the properties of Quantum Dots buried within a matrix material. In keeping with the emphasis of the conference, Frances Ross presented results where the growth of Ge nanostructures on FIB patterned substrates was observed using low energy electron microscopy. The challenges facing the application of these

structures in future computer generations were outlined in a talk entitled “Nanostructures for Quantum Computing” by Andrew Briggs.

This conference not only enabled me to gain an overview of the exciting new developments in the field of semiconductors in general, but also provided me with a wealth of new ideas for my research. I would hence recommend the next MSM conference in 2005 to everyone interested in semiconductors.

*Christian Lang, University of Oxford
sponsored by EMAG bursary*

**Ninth WIEN – WORKSHOP (L/APW + lo calculations with the WIEN2k code)
April 23-26 2003, Vienna, Austria**

My DPhil project is concerned with the electronic structure of fullerenes encapsulating one or more atoms. This knowledge is important for the potential application of these structures, which includes their use in quantum computers.

Electron energy loss spectroscopy (EELS) provides a probe of the unoccupied density of states of a molecule and is useful for obtaining information on the valence state and bonding of atoms within the molecule, while density functional theory (DFT) can be used to model the density of states of the molecule. A combination of EELS and DFT can be used to understand differences in EELS spectra from two similar molecules.

The WIEN2k program is the DFT package that I am currently using to carry out the modelling aspect of my project. The WIEN2k Workshop was specifically about this program. The first two days were aimed at new users and included a large amount of practical work. Lectures were given on the basic theory behind the program and how to run a calculation including descriptions of some of the input and output files. The last two days were designed to also include more experienced users and consisted of talks and a poster session. Talks were given by the TU Wien group on the development and use of the program, including non linear optics and magnetism and the ELNES package which produces EELS spectra. A package developed for calculating phonons was presented by Krzysztof Parlinski (Cracow, Poland) and there were several talks on the use of the code to tackle problems such as phase stability (David Pankhurst, Oxford, UK) and transport properties (George Madsen, Aarhus, Denmark).

As a new user, the first two days of the workshop were particularly useful. They gave me the opportunity to run calculations whilst being able to ask questions to the people who have written and developed the code. The talks given during the second two days gave an idea of the large breadth of work that people use the code for and the poster session allowed me to meet and talk with people tackling similar areas of research to my own.

One of the main outcomes of the workshop is that I feel more confident in using WIEN2k. I know where I am with my calculations, what I need to do next and how I am going to do it.

*Rebecca Nicholls, Department of Materials, University of Oxford
sponsored by EMAG bursary*

**The Fifth International Conference on Nitride Semiconductors, Nara, Japan
May 26th to 30th 2003**

The Fifth International Conference on Nitride Semiconductors was held in Nara, Japan at the end of May, 2003. In spite of a number of last minute changes to the programme due to delegates from regions with SARS outbreaks withdrawing, the conference still had over 600 delegates from 21 countries and more than 400 papers.

Although much of the attention was centred on the electrical characteristics of nitride based devices, a number of interesting talks on the microscopy of these materials and devices were presented. In the Monday plenary session, Fernando Ponce summarised the current level of knowledge of InN and InGaN layers, and highlighted many applications of electron microscopy to probe this system,

including the use of CBED to analyse the strain distributions in layers and electron holography to investigate the distribution of electrostatic charges (covered in more detail by a later talk by Cai, also of Arizona State University). The need for caution in analysis of TEM images of InGaN quantum wells due to beam damage was raised, and material damage to these structures under irradiation was graphically illustrated later in the conference by Smeeton et al (Cambridge), who showed video recordings illustrating the rapid change in contrast under even low intensities of irradiation. It was stressed that material changes induced by radiation damage could be falsely interpreted as indium clustering.

The properties of defects in the group III-nitrides remain of great interest. Simulations and HRTEM images of a new type of dislocation in GaN with no broken bonds in the core were presented by Lymperakis (Fritz-Haber). The structure of this dislocation becomes energetically favourable once the significant strain field is taken into account. Arslan (Illinois) used Z-contrast STEM and EELS to probe defects in GaN, and reported that the edges of nanopipes were GaO, with O replacing N up to 20 monolayers from the nanopipe. Normal screw dislocations showed no O impurities. The possibility of dislocation motion in Nitride devices was investigated by two groups. Yu (Santa Barbara) annealed GaN at 1500°C under 100 bar N₂ overpressure, and observed dislocations bending, meeting and annihilating. However, Tomiya (Sony) showed that plan view TEM analysis of the active regions of 100 hour aged laser devices indicate no dislocation multiplication or motion, and suggested that the threading dislocations may not play an important role in the lifetime of these devices. In-situ e-beam irradiation was also found not to cause glide in the threading dislocations in the active layer. Mg-related Pyramidal defects were observed in the p-type layers, and it was suggested that the migration of Mg related point defects to the active region were the major limit to device lifetime.

*M W Fay, University of Nottingham
sponsored by EMAG bursary*

COMMITTEE MEMBER REPORTS FROM MEETINGS

Developments in FEGTEM V, University of Leeds, July 14th 2003

This one day meeting organised through the RMS and co-sponsored by EMAG changed venue this year, after 4 successful meetings at Oxford, and was staged at the Institute for Materials Research at Leeds. After the normal slow take up of pre-registration, which is becoming increasingly a problem for organisers, eventually 57 registrants attended from both academia, industry and the trade – which was most encouraging. Furthermore the sun shone – perhaps a little too brightly which is often a problem on the Yorkshire Riviera.

Field emission TEMs have become somewhat of a mature tool, since their arrival en masse in the UK over the last five years, however new machines are still being placed in Universities. The format of the meeting contained both reports of machine performance and usage (Crispin Hetherington representing the Oxford Materials FEGTEM and Ian Ross representing Sheffield Electrical Engineering FEGTEM), as well as details of the application of specific techniques, such as spectrum imaging (Maureen Mackenzie representing Glasgow FEGTEM and Adam Papworth representing the Liverpool STEM). These reports were interspersed with specific applications-based talks.

The morning session was dedicated to the Biological sciences, where Dr Andreas Hoenger of the European Molecular Biology Lab in Heidelberg elegantly described FEGTEM based studies of molecular motor proteins which contained some amusing demonstrations of the possible mechanisms by which such motors walk along fibril tracks reminiscent of John Cleese and the Ministry of Silly Walks. This was followed by similar protein crystallography studies described by Neil Ranson of Leeds and Per Bullough of Sheffield who also described how TEM studies on large protein complexes complement high resolution X-ray studies on individual protein components. It is clear that the coherence of FEG sources is allowing the resolution of the TEM-derived structures to approach those of X-ray studies providing very valuable information on missing structures in these complex biological machines. Andy Brown of Leeds then described his analytical FEGTEM studies of ferritin nanoparticles in liver sections which may allow a mechanistic and chemical interpretation of a disease related to iron overload.

Following lunch which included posters on FEGTEM of semiconductors from Ana Sanchez and Mhairi Gass of the University of Liverpool, the second invited talk was by Stig Helveg from the Haldor Topsoe catalyst company in Copenhagen, Denmark, who gave a superb summary of in-situ FEGTEM studies on catalyst systems by HREM and EELS. He demonstrated the changing nature of metal nanoparticle morphologies on catalysts supports under reaction conditions and presented a truly amazing video of the real-time growth of carbon nanotubes on catalysts during in-situ reaction. Clearly these studies are critical in the application of advanced microscopy techniques to real chemical processes. Geoff West (Warwick) and Binbing Tang (Birmingham) then presented results from the Midlands FEGTEM on STEM ADF imaging of grain boundary segregation in ceramics and hole drilling in nickel aluminide intermetallics, respectively. Clair Calvert (Leeds) showed the application of analytical FEGTEM to the highly topical issue of ultrafine environmental particulates and Andrew Bleloch rounded off the meeting with an update on the SuperSTEM project.

All in all an encouraging day with good feedback from attendees, clearly showing how FEGTEMs have matured as an analytical tool and are being applied to a wide range of physical and biophysical problems. We look forward to the meeting next year hopefully in a different venue.

Rik Brydson, University of Leeds

ELECTRON MICROSCOPY AND ANALYSIS GROUP

FUTURE MEETINGS OF INTEREST

Forthcoming Institute of Physics and Royal Microscopical Society meetings of interest are briefly listed:

2003

3 - 7 August

Microscopy and Microanalysis 2003

San Antonio, USA

<http://www.msa.microscopy.com>

2 September

EMAG Advanced School

Oxford University

3 - 5 September

Electron Microscopy and Analysis Group Conference

Oxford University

<http://physics.iop.org/IOP/Confs/EMG/>

05 - 10 Oct 2003

9th Frontiers of Electron Microscopy in Materials Science - FEMMS2003

Berkeley, CA, United States

<http://femms2003.llnl.gov>

2004

13-14 January

**Nano Particles and Nanostructured Materials:
Implications for Health 2004**

Daresbury Laboratories

(RMS event)

19 - 23 April 2004

EM Spring School

Sheffield

(RMS event)

06 - 08 July 2004

Microscience 2004

EXCEL, London

(RMS event)

22 - 27 August 2004

13th European Microscopy Congress, EMC 2004

University of Antwerp, RUCA campus, Belgium

<http://www.ruca.ua.ac.be/emc2004/index.htm>

ELECTRON MICROSCOPY AND ANALYSIS GROUP

Contact Points

- IoP:** Institute of Physics, Conference Dept., 76 Portland Place, London, W1N 4AA.
Tel: +44 171 470 4800, Fax: +44 171 470 4900
Email: conferences@iop.org
<http://www.iop.org/IOP/Confs/>
- MRS:** Materials Research Society, 9800 McKnight Road, Pittsburgh,
PA 15237, USA.
Tel: +1 412 779 3003, Fax: +1 412 779 8313
<http://www.mrs.org/meetings/>
- MSA:** Microscopy Society of America, 4 Barlows Landing Road, Suite 8, Pocasset,
MA 02559, USA.
Tel: +1 508 563 1155, Fax: +1 508 563 1211
<http://www.MSA.microscopy.com/>
- RMS:** Royal Microscopical Society, 37/38 St. Clements, Oxford, OX4 1AJ.
Tel: +44 1865 248 768 Fax: +44 1865 791 237
Email: meetings@rms.org.uk <http://www.rms.org.uk/events/>

ELECTRON MICROSCOPY AND ANALYSIS GROUP

NOMINATIONS for ELECTION to the EMAG COMMITTEE

There are vacancies for 4 ordinary members on the EMAG committee for the forthcoming session. Accordingly, you are invited to nominate candidates as Committee Members. Both the Proposer and Seconder, who must be members of the Group, should complete the relevant sections of this form and the approval of the Nominee, who must be a member (or a Subscriber) of the Institute, should be signified by his/her signature. No person may propose or second more than one Nomination for any particular post.

Nominations should be sent directly to the Honorary Secretary to arrive before the deadline of 15th August 2003. The Group Committee may make further Nominations before the postal ballot forms are circulated in August.

COMMITTEE POST: _____

Nominee: Name _____ (Signature _____)
IoP Membership Grade _____
Address _____

Proposer: Name _____ (Signature _____)
IoP Membership Grade _____
Address _____

Seconder: Name _____ (Signature _____)
IoP Membership Grade _____
Address _____

When completed, this form should be sent to:

Dr Paul D Brown
The Honorary Secretary - EMAG
c/o School of Mechanical, Materials, Manufacturing Engineering and Management
University of Nottingham
University Park,
Nottingham
NG7 2RD

EMAG BURSARY APPLICATION FORM

PERSONAL DETAILS			
Name		Email	
Address			
Title		Age	
IoP/EMAG Member	Yes / No	IOP Number	Applying for Membership
Current Status	FT Student	Postdoc	Other - specify

CONFERENCE DETAILS		
Name of Meeting		
Date of Meeting		
Place of Meeting		
Title of Paper/Poster		
Has paper been accepted for presentation?	Yes	Don't know yet

SHORT COURSE DETAILS	
Title of Course	
Date of Course	
Place of Course	

FINANCIAL DETAILS		
Estimated Expenditure	Registration Fee Travel Costs Accommodation Subsistence	
	Total	£

Have you been promised a contribution towards your funding from any other sources?	Yes / No
If so, please specify the source and the amount they are prepared to contribute	

Have you received an EMAG bursary within the last 12 months?	Yes / No
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SIGNATURE	DATE
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Please send completed form and

- a letter of support from your academic supervisor and
- a copy of your paper abstract (if applicable)

to : Dr David McComb, Department of Materials, Imperial College London, Exhibition Road, London SW7 2AZ. (Email: d.mccomb@imperial.ac.uk)